

On the Brain of Eunice Harassii and its Relations with the Hypodermis. By M. E. JOURDAN.

Quatrefages and Claparède were the first to indicate the relations that exist between the hypodermic cellular layer and the nervous centres in some Annelides. More recently Ehlers, with reference to the brain of the species which is the subject of the present note, and Spengel, in his memoir upon a Eunician, *Oligognathus Bonelliae*, have pointed out the difficulty of separating the brain from the hypodermis in the cephalic lobe of these worms. These notions, so contrary to the classical data and figures relating to the brain of most Annelides, seemed to us to need confirmation. With this view we have made sections of the whole of the cephalic lobe, including both the brain and the integuments of the species under consideration. The observations that we have been able to make by this method have not only allowed us to demonstrate the correctness of the opinion of Ehlers and Spengel, but have also revealed some new facts.

The brain of *Eunice Harassii*, upon the external form of which we shall say nothing, seeing that this apparatus is very imperfectly limited, consists essentially of a central mass of punctate substance, surmounted by a thick layer of nervous cells, designated by Ehlers the *nuclear layer*.

Above this nuclear zone, and immediately beneath the cuticle, we see epithelial elements in the form of cones, with their apices directed towards the deeper surface of the integuments. The feet of these hypodermic cells, instead of terminating upon a basal, as in the case of the integuments of the rest of the body, become transformed and prolonged into so many rigid threads, which penetrate into the nuclear layer, grouping themselves together in larger or smaller numbers, to form a sort of pillar passing from the cuticle to the mass of punctate substance. The protoplasm of these hypodermic cells is much reduced in quantity; their nuclei have a characteristic fusiform aspect. The basal prolongations appear as rigid threads with a vitreous aspect and with a clean fracture. United into bundles, these hypodermic fibres are not stained readily by carmine or by hæmatoxyline; but under the influence of hæmatoxylic eosine they acquire the pearl-grey coloration characteristic of the cuticle and basals of the hypodermis of Annelides. It is impossible to trace one of these filaments from the hypodermic cell to which it belongs to the punctate substance; they lose themselves in the nuclear layer, where they become intimately confounded with other fibrillæ presenting similar histological characters, but having a different origin.

The nuclear layer is justly regarded by Ehlers and Spengel as of nervous nature, but it is composed of elements of varied aspect. In a section this layer appears as a delicate network filling up the space between the pillars of which we have just spoken, and the meshes of which are occupied each by a spherical nucleus. It is

very difficult, in the sections, to know whether this network is constituted by sections of cell-membranes soldered together by means of a cement or by very delicate fibres. Dissociations enable us easily to answer this question; they show that the nuclear layer consists of nerve-cells each possessing a large nucleus, a protoplasm so reduced that they seem to be destitute of it, and a fine enveloping membrane. We notice also that from each of these cells there start most frequently one, but sometimes two processes. These filaments are very delicate, and, when examined with an objective giving an enlargement of 400 or 500 diameters, comparable to the appearance presented by a spider's thread seen with the naked eye. By several of them becoming grouped and soldered together, these filaments constitute the cross-lines of the meshes of the network which are observed in the sections. Among these cells reduced to their nucleus, which form nearly the whole of the nuclear layer, we observe a certain number distinguished by their larger dimensions; they possess a nucleus and a finely granular protoplasm, which is coloured yellow by picocarmine; from their peduncle starts a process which mingles with those of the small nerve-cells, and likewise penetrates into the punctate substance.

By examining the boundaries of the nuclear layer and punctate substance we easily distinguish a great number of fibrillæ which emanate from the nerve-cells and become connected with the punctate substance. It is impossible to say what the fibrillæ of the hypodermic cells become at this level, or to know whether they penetrate into the punctate substance or lose themselves at its surface. These fibres, of which the origin and no doubt the functions are so different, in fact present such similar histological characters in *Eunice Harassii* that it is impossible to distinguish them. The punctate substance itself consists essentially of a mass of interlaced fibrillæ forming a network which is more or less close in different regions. The spaces left vacant by the meshes of this fibrillar network are filled up by a finely granular protoplasm, which acquires a lilac-rose colour with hæmatoxylic eosine, and is perhaps comparable with the granular substance of the neuroglia of Vertebrates.

The principal facts resulting from the preceding observations, and which seem to us to be of some interest in general anatomy, are as follows:—In the first place, the intimate mixture of the hypodermic epithelial cells and of their basilar processes with the cells of the nerve-fibres, from which results the difficulty of defining the brain in a clear and certain manner; and the absence of any histological character enabling us to distinguish the basilar fibrillæ of the hypodermic cells from the nervous fibres. It seems to us to be interesting to point out these anatomical peculiarities, which remind us of the condition of the nervous system in the larvæ of Annelides*.—*Comptes Rendus*, May 19, 1884, p. 1292.

* Kleinenberg, "Origine du système nerveux central des Annelides," in *Archives Italiennes de Biologie*, tome i. p. 67.